

the sternum, costal process, and the underside of the marginal shield is white, there being two small round black spots on the underside of each of the five front marginal shields. The head and neck are beautifully marked with very regular pale streaks, but there is no spot behind the eye, and no ring round the margin of the ear. This indicates the existence of a very distinct species; and Dr. Günther thinks that it is the young state of the *Emys grayii*, which he has lately described (see *anteà*, p. 504) from the adult shell, without the animal.

The *Mauremys fuliginosa* (*anteà*, p. 500) has the markings on the head and neck somewhat similar to those of *Emys flavipes*, but sufficiently distinct to define this species, which is also at once known by the depressed and nearly uniform black shields of the shell.

12. On the Classification of the *Helicterinae*.

By HARPER PEASE, C.M.Z.S.

From a history of the genus *Helicter* which I published in this Society's 'Proceedings' (1862, p. 3) it appears that it was first named and described by Férussac in 1821*, and that this term consequently takes precedence of *Achatinella* (Swains.), 1828†.

I now propose to elevate it to the rank of a subfamily, and to distinguish the several groups of species which it comprises by generic names. They are as distinct, as strictly definable, and vary even more widely than those of any other subfamily of land shells. From the difference in their habits and stations, we may also expect to find the animals to vary correspondingly when examined.

Had the several species been received in Europe at different times without their locality being known, they would have been distributed over five or six old established genera. They are, in fact, a natural subfamily, confined to the Hawaiian Islands, representing within themselves, by the forms of their shells, several genera inhabiting distant localities, in a similar manner to several other genera inhabiting Polynesia, such as *Pitys*, species of which have been classed by authors with the European genus *Patula*, although the animals of the two are widely distinct. I will not notice at present the several attempts made of late years to dismember the *Helicterinae* and unite several species to foreign genera, such as *Bulea* and others, as I am convinced that the "Testaceous classification" adopted by those authors will be abandoned so soon as the result of the researches of persons now permanently located at many localities in the tropics and elsewhere, formerly but rarely visited and hastily explored, are made known.

As to the distribution of genera and species over the several islands of the group, I remark generally that, with the exception of the genus *Leptachatina* (the species of which are small and of simple

* Tableau Syst. des An. Mollusques, 1821, p. 56; Voy. par M. de Freycinet, 1824, p. 475.

† Quarterly Journal of the Royal Institution, 1828, p. 81.

character), no species is common to any two of the islands, and but few analogous; most of the genera are not only confined to one island, but to a certain district on that island. The localities recorded are in many cases incorrect, especially of those species furnished to the late H. Cuming by Dr. Frick.

Ten subgenera of *Helicterinae* have been proposed by authors, all of which, with slight modifications, I retain as genera, adding three.

388 species have been described, 166 of which I class as synonyms or varieties; 222 consequently remain distinct. The following Table furnishes the area of each island in square miles, and the number of species and genera described from each* :—

	Kauai.	Oahu.	Molokai.	Maui.	Lanai.	Hawaii.
Area . .	630	610	220	650	150	3800
Species .	21	128	24	31	12	6
Genera .	2	9	7	8	6	3

I introduce only such synonyms as have not been recorded heretofore. They are explained below.

Family HELICIDÆ.

Subfamily HELICTERINÆ.

Testa imperforata vel subperforata; sinistrorsa vel dextrorsa; columella plica torta munita, rarius Bulimi- vel Achatiniformi; labro intus plus minusve incrassato, rarius tenui; saepe magis minusve expanso.

Animal ovoviviparum.

Genus 1. HELICTER (Fér.).

T. crassa, solida, polita, globoso-conica; apice acuto; plica columellari valida; labro incrassato.

Helicter aptycha (Pfr.).

— *bicolor* (Gul.).

— *cestus* (Newc.).

— *decora* (Fér.).

— *lugubris* (Chem.).

— *lorata* (Fér.).

— *mustelina* (Migh.).

— *morbida* (Pfr.).

Helicter multilineata (Newc.).

— *ovum* (Pfr.).

— *pulchella* (Pfr.).

— *perversa* (Swains.) =

“*cinerosa*” (Pfr.).

— *swifti* (Newc.).

— *turgida* (Newc.).

— *vittata* (Rve.).

I retain the generic name given by Férussac to the whole subfamily

* The small islands of Kahului, 40 square miles, and Niihau, 10 square miles, have not been examined. They have a scanty growth of low bushes over a portion of their surface, where one or two species of *Leptachatina* may possibly be found. [For a recent Map of the Sandwich Islands, see Journ. R. Geograph. Soc. 1868, p. 361.—P. L. S.]

for the group of species represented by *H. lugubris* (Chem.), which was the first species described.

The species of this genus are thick, solid, polished, globose conic, with the apex acute. They are quite distinct from *Bulimella*, with which they have heretofore been associated.

Genus 2. ACHATINELLASTRUM (Pfr.).

Achatinellastrum, Pfr. Mal. Blätt. 1854, p. 133; Mon. Hel. Viv. 1859, vol. iv. p. 531.

T. turrita aut elongato-conica, solida, epidermide nitida; plica columellari valida, torfa, dentiformi; perist. recto; labro via incrassato.

Achatinellastrum bilineatum
(Rve.).

— *buddi* (Newc.).

— *castaneum* (Rve.) =

“*adustum*” (Rve.).

— *cucumis* (Gul.).

— *fulgens* (Newc.).

— *formosum* (Gul.).

— *grayanum* (Pfr.).

Achatinellastrum johnsoni
(Newc.).

— *liliaceum* (Pfr.).

— *olivaceum* (Rve.).

— *productum* (Rve.).

— *pulcherrimum* (Swains.).

— *trilineatum* (Gul.).

— *vulpinum* (Fér.).

— *versipilis* (Gul.).

Sec. 2.

— *dubium* (Newc.).

— *radiatum* (Gld.).

I restrict the above genus to the species allied to *A. productum* (Rve.). They are confined in their habitat to the easterly end of the island of Oahu.

Sec. 2 includes two aberrant forms, which agree with each other in their general characters, but differ from the type in being of thinner texture, not so elongate. *A. dubium* is without any columellar fold, and *A. radiatum* has it but slightly developed.

Genus 3. BULIMELLA (Pfr.).

Bulimella, Pfr. Mal. Blätt. 1854, p. 119; Mon. Hel. Viv. vol. iv. 1859, p. 518.

T. imperforata, bulimiformis, polita, solida, ovato-conica, apice obtuso; plica columellari valida; labro intus incrassato.

Bulimella bulimoides (Swains.).

— *elegans* (Newc.).

— *faba* (Pfr.).

— *glabra* (Newc.).

— *hanleyana* (Pfr.).

— *ovata* (Newc.).

Bulimella rosea (Swains.).

— *rutila* (Newc.).

— *soverbyana* (Pfr.).

— *swainsoni* (Pfr.).

— *tæniolata* (Pfr.).

Sec. 2.

— *byronii* (Gray).

— *decipiens* (Newc.).

— *rugosa* (Newc.).

— *subvirens* (Newc.).

— *viridans* (Migh.).

Sec. 3.

<i>Bulimella abbreviata</i> (Rve.) =	<i>Bulimella sordida</i> (Newc.).
"bacca" (Rve.).	<i>solitaria</i> (Newc.).
— <i>colorata</i> (Rve.).	— <i>multicolor</i> (Pfr.).
— <i>germana</i> (Newc.).	

This genus is restricted to the species with obtuse apex, represented by *B. rosea* (Swains.). They inhabit the westerly end of the island of Oahu. A short distance from their habitat several species are found, which we class under Sec. 2, not so robust in shape, with apex less obtuse, and surface rough. Sec. 3 comprises a few species still further removed from the type, being smooth, and the apex subacute. They might also with propriety be classed under the genus *Achatinellastrum*.

Genus 4. EBURNELLA (Pse.).

T. solida, polita, lævis, oblongo-ovata, plica columellari vulida, torta; labro vix incrassato; apice obtusiusculo, aut acuto.

<i>Eburnella casta</i> (Newc.).	<i>Eburnella recta</i> (Newc.).
— <i>curta</i> (Newc.).	— <i>saccata</i> (Pfr.).
— <i>livida</i> (Swains.).	— <i>undulata</i> (Newc.).
— <i>porcellana</i> (Newc.).	

Sec. 2.

— <i>semicarinata</i> (Newc.).	— <i>variabilis</i> (Newc.).
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This genus is established for a group of small, solid, polished species, resembling in their texture those of *Helicter*. They are of an elongate ovate form, the apex somewhat obtuse, and the columellar fold prominent and twisted; lip but slightly thickened within, its edge thin. They inhabit the westerly end of the island of Oahu.

I add two species from the island of Lanai, which are more nearly allied to this genus than any other.

Genus 5. PARTULINA (Pfr.).

Partulina, Pfr. Mon. Hel. Viv. vol. iv. 1859, p. 516.

<i>Partulina compta</i> (Rve.).	<i>Partulina rufa</i> (Newc.).
— <i>dwrighti</i> (Newc.).	— <i>splendida</i> (Newc.).
— <i>gouldi</i> (Newc.).	— <i>tappaniana</i> (C. B. Ad.).
— <i>marmorata</i> (Gld.).	— <i>tessellata</i> (Newc.).
— <i>proxima</i> (Pse.).	— <i>virgulata</i> (Migh.).

Sec. 2.

— <i>crassa</i> (Newc.)	— <i>grisea</i> (Newc.).
— <i>dolium</i> (Pfr.).	

The above genus is confined to the islands of Maui and Molokai.

Of Sec. 2 the most aberrant form is *Partulina crassa*, which inhabits the island of Lanai.

Genus 6. LAMINELLA (Pfr.).

Laminella, Pfr. Mal. Blätt. 1854, p. 126; Mon. Hel. Viv. 1859, vol. iv. p. 546.

T. elongato-ovata vel turrata; plica columellari lamelliformi, torta, compressa; perist. simplici, recto; labro tenui aut sub-incrassato.

Laminella gravida (Fér.).

— *picta* (Migh.).

— *straminea* (Rve.).

Laminella magna (C. B. Ad.) =

“*baldwini*” (Newc.).

— *violacea* (Newc.) =

“*gigantea*” (Newc.).

Sec. 2.

— *bella* (Rve.) =

“*polita*” (Newc.).

— *concaospira* (Pfr.).

— *concinna* (Newc.).

— *erecta* (Pse.).

— *fusoidea* (Newc.).

— *mighelsiana* (Pfr.).

— *remyi* (Newc.).

— *sanguinea* (Newc.).

— *terebra* (Newc.).

— *tetrao* (Newc.).

— *venusta* (Migh.) =

“*citrina*” (Pfr.).

— *zebra* (Newc.).

Sec. 3.

Laminella physa (Newc.).

The typical species of this genus are peculiar in having their outer lip thin. We place provisionally under Sec. 2 a number of species which agree with the type in the character of the outer lip. They are of smaller size and generally more elongate in shape.

I also add a peculiar species, inhabiting Hawaii, which has no distinct allies.

Genus 7. FRICKELLA (Pfr.).

Frickella, Mal. Blätt. 1855, p. 2; Mon. Hel. Viv. 1859, vol. iv. p. 569.

Frickella amœna (Pfr.).

Genus 8. PERDICELLA (Pse.).

T. dextrorsa vel sinistrorsa, bulimiformi, turrata vel elongato-conica, imperforata, tenuiter striata; plica columellari vix conspicua vel nulli; perist. simplici; labro tenui.

Perdicella alexandri (Newc.).

— *helena* (Newc.).

— *minuscula* (Pfr.).

— *manoensis* (Newc.).

Perdicella sandwichensis (Pfr.).

— *ornata* (Newc.).

— *zebrina* (Pfr.).

A group of prettily painted little shells, strictly bulimiform in all their characters.

Genus 9. NEWCOMBIA (Pfr.).

T. sinistrorsa, subimperforata, elongata, costata, plicata, aut sulcata; plica columellari nulla; perist. simplici, subrecto.

- | | |
|-----------------------------------|-----------------------------------|
| <i>Newcombia cumingi</i> (Newc.). | <i>Newcombia plicata</i> (Migh.). |
| — <i>cinnamomea</i> (Pfr.). | — <i>philippiana</i> (Pfr.). |
| — <i>newcombiana</i> (Pfr.). | — <i>sulcata</i> (Pfr.). |

Sec. 2.

- | | |
|-------------------------------|---|
| — <i>hutchinsonii</i> (Pse.). | — <i>obscura</i> (Newc.) =
“ <i>mæsta</i> ” (Newc.). |
|-------------------------------|---|

The species of this genus are easily distinguished by their slender elongate shape and simple columella.

I add, in Sec. 2, two species, similar in shape, but covered with a coarse epidermis, and furnished with a slight columellar fold; one is dextral.

Genus 10. AURICULELLA (Pfr.).

Auriculella, Pfeiff. Proc. Zool. Soc. 1855, p. 1; Mon. Hel. Viv. 1859, vol. iv. p. 569.

T. subperforata vel imperforata, oblongo-conica aut elongata; pariete aperturali lamella spiraliter intrante munito; plica columellari supera dentiformi vel obsoleta; perist. expansiusculo.

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|--------------------------------------|--|
| <i>Auriculella auricula</i> (Fér.) ✓ | <i>Auriculella obeliscus</i> (Pfr.). ✓ |
| — <i>ambustu</i> (Pse.) ✓ | — <i>pulehra</i> (Pse.) ✓ |
| — <i>cærea</i> (Pfr.) ✓ | — <i>petitiana</i> (Pfr.) ✓ |
| — <i>chamissoi</i> (Pfr.) ✓ | — <i>punicata</i> (Migh.). |
| — <i>expansa</i> (Pse.) ✓ | — <i>triplicata</i> (Pse.). |
| — <i>lurida</i> (Pfr.) ✓ | — <i>uniplicata</i> (Pse.). |

This genus is the most aberrant in form of the family. The species are small and distinguished by a lamina on the wall of the aperture, in addition to the usual columellar fold. The young have in some cases been mistaken for *Tornatellinæ*.

Genus 11. AMASTRA (H. & A. Ad.).

Amastra, Adams, Gen. Mollusca, 1858, vol. ii. p. 137.

T. plerumque dextrorsa, epidermide munita; plica columellari valida, sublamellaformi; perist. intus incrussato, interdum subperforato.

- | | |
|---------------------------------|------------------------------------|
| <i>Amastra anthoni</i> (Newc.). | <i>Amastra reticulata</i> (Newc.). |
| — <i>furcimen</i> (Pfr.). | — <i>similaris</i> (Pse.). |
| — <i>inflatu</i> (Pfr.). | — <i>solidu</i> (Pse.). |
| — <i>irregularis</i> (Pfr.). | — <i>sphærica</i> (Pse.). |
| — <i>nigra</i> (Newc.). | — <i>tristis</i> (Fér.). |
| — <i>nucleola</i> (Gld.). | — <i>textilis</i> (Fér.). |
| — <i>obesa</i> (Newc.). | — <i>ventulus</i> (Fér.). |
| — <i>porphyrostomu</i> (Pse.). | — <i>biplicata</i> (Newc.) = |
| — <i>rugulosa</i> (Pse.). | “ <i>deshayesii</i> ” (Morelet). |

Sec. 2.

<i>Amastra assimilis</i> (Newc.).	<i>Amastra mastersii</i> (Newc.).
— <i>affinis</i> (Newc.).	— <i>mucronata</i> (Newc.).
— <i>flavescens</i> (Newc.).	— <i>melanosis</i> (Newc.).
— <i>humilis</i> (Newc.).	— <i>nubilosa</i> (Migh.).
— <i>lineolata</i> (Newc.).	— <i>pusilla</i> (Newc.).
— <i>micans</i> (Pfr.).	— <i>rubens</i> (Gld.).
— <i>modesta</i> (C. B. Ad.).	— <i>variegata</i> (Pfr.).

Sec. 3.

— <i>petricola</i> (Newc.).	— <i>elongata</i> (Newc.).
— <i>soror</i> (Newc.).	

Sec. 4.

— <i>spirizona</i> (Fér.).	— <i>intermedia</i> (Newc.).
— <i>turritella</i> (Fér.) =	— <i>luctuosa</i> (Pfr.).
“ <i>luteola</i> ” (Fér.).	— <i>cylindrica</i> (Pfr.).
— <i>porphyrea</i> (Newc.).	— <i>sericea</i> (Pfr.).

All the species of this genus are terrestrial. They are covered with an epidermis, more or less roughened and striate, occasionally smooth. Their colour is of a uniform dark brown, sometimes inclined to chestnut on the smoother species, and occasionally relieved by light yellowish bands, at the suture usually. As the genus is represented on all the islands of the group, they present more variation in shape than those of the other genera, which may lead, when more fully known, to their separation.

A. obesa (Newc.) and *A. sphaerica* (Pse.) are quite distinct from the other species. I have separated, under Sec. 2, a number of lighter growth, thin epidermis, sometimes reticulated; and three species under Sec. 3, of small size, thin, and outer lip simple and acute. A group inhabiting a separate range of hills on Oahu have been associated under Sec. 4. Although the extreme shapes appear to be widely apart, they are connected by intermediate forms.

GENUS 12. LEPTACHATINA (Gld.).

Leptachatina, Gould, Proc. Bost. Soc. 1848, p. 200; Mon. Hel. Viv. 1859, vol. iv. p. 563.

T. ovato-oblonga vel turrita, tenuis, vitrea, plerumque pellucida; plica columellari debili, sæpe nulla; perist. simplici, acuto, recto.

· Achatini- vel Bulimiformes.

<i>Leptachatina acuminata</i> (Gld.).	<i>Leptachatina lucida</i> (Pse.).
— <i>accincta</i> (Migh.).	— <i>obsoleta</i> (Pfr.).
— <i>chrysalis</i> (Pfr.).	— <i>sandwichensis</i> (Pfr.).
— <i>clausina</i> (Migh.).	— <i>saxatilis</i> (Gul.).
— <i>cylindrata</i> (Pse.).	— <i>scutilus</i> (Migh.).
— <i>kanaiensis</i> (Pfr.).	— <i>sculpta</i> (Pfr.).

Sec. 2.

Læves aut tenuiter striatæ.

<i>Leptachatina antiqua</i> (Pse.).	<i>Leptachatina gracilis</i> (Pfr.).
— <i>brevicula</i> (Pse.).	— <i>lævis</i> (Pse.).
— <i>cerealis</i> (Gld.).	— <i>nitida</i> (Newc.).
— <i>cornea</i> (Newc.).	— <i>obclavata</i> (Pfr.).
— <i>cingula</i> (Migh.).	— <i>obtusa</i> (Pfr.).
— <i>compacta</i> (Pse.).	— <i>pyramis</i> (Pfr.).
— <i>exilis</i> (Gul.).	— <i>resinula</i> (Gul.).
— <i>extincta</i> (Pfr.).	— <i>simplex</i> (Pse.).
— <i>grana</i> (Newc.).	— <i>teres</i> (Pfr.).
— <i>guttula</i> (Gld.).	

Costulosæ.

— <i>balteata</i> (Pse.).	— <i>margarita</i> (Pfr.).
— <i>costulosa</i> (Pse.).	— <i>oryza</i> (Pfr.).
— <i>dimidiata</i> (Pfr.).	— <i>striatula</i> (Gld.).
— <i>extensa</i> (Pse.).	— <i>senicostata</i> (Pfr.).
— <i>fusca</i> (Newc.).	— <i>tenuicostata</i> (Pse.).
— <i>fuscula</i> (Gul.).	— <i>terebralis</i> (Gul.).
— <i>glutinosa</i> (Pfr.).	— <i>tenebrosa</i> (Pse.).

All the species of this genus are small, thin, and those of the type without columellar fold. They are widely distributed, being found on all parts of the several islands. There are a number of species which agree with the type in their general characters, but are usually thicker, and have a columellar fold more or less developed, and more elongate in shape. They unite with species of the genus *Labiella*.

Genus 13. LABIELLA (Pfr.).

Labiella, Pfeiff. Mon. Blatt. 1854, p. 142; Mon. Hel. Viv. 1859, vol. iv. p. 530.

T. oblonga, solida; plica columellari torta; perist. obtuso, labiuto, margine dextro incrassato.

<i>Labiella callosa</i> (Pfr.).	<i>Labiella pachystoma</i> (Pse.).
— <i>labiata</i> (Newc.).	

Sec. 2.

— <i>corneola</i> (Pfr.).	— <i>succincta</i> (Newc.).
— <i>crassilabrum</i> (Newc.).	— <i>subrostrata</i> (Pfr.).
— <i>ellipsoidea</i> (Gld.).	— <i>turgidula</i> (Pse.).
— <i>alholabris</i> (Newc.).	— <i>vitrea</i> (Newc.).
— <i>fumosa</i> (Newc.).	

This genus was founded by Dr. Pfeiffer on two species, of which the outer lip is unusually thickened.

Mature specimens of these species not more thickened than several other species closely allied to them in their other characters, are common. I have consequently added several to this genus. They approach through their varieties certain species of *Leptachatina*.

Both this and the previous genus will require revision as more specimens and species are collected.

Synonymy.

- H. deshayesii* (Morelet). This species appears to have been overlooked by all writers on the genus. I learn, however, from its author that it is identical with *H. buplicata* (Newc.).
- H. luteola* (Fér.). This is the only one of the early described species which remains unidentified. It was described by Fé-russac from the specimens collected at our islands by M. Quoy. It will be observed that all the species collected by him are from the island of Oahu. A variety of *H. turritella* (Fér.) agrees, as to colour and other characters, with the description of *M. Deshayes* especially; and we have placed it consequently as a synonym of this species.
- H. maesta* (Newc.) inhabits the island of Lanai, in company with *H. obscura* (Newc.), of which it is a small variety.
- H. citrina* (Migh.) varies from *H. venusta*, Migh., only in being of a plain uniform yellowish colour. This species also occurs of a uniform slate- or occasionally olive-colour. Most of the specimens are ornamented with black reticulated lines, more usually confined to the spire; occasionally, however, the whole shell is densely covered with black markings.
- H. bacca* (Rve.) is a variety of *H. abbreviata* (Rve.), of smaller size, and of uniform colour.
- H. polita* (Newc.) inhabits the island of Molokai, in company with *H. bella* (Rve.), from which it varies only in the disposition of its colours. This species passes through more variations of colour and shape than have been noted heretofore. It may be always distinguished by its purple-tinted columella.

13. On the Cervine Animals of the Island of Hainan (China).

By ROBERT SWINHOE, F.Z.S.

I have brought with me from Hainan the horns and skins of three species of Deer (a *Cervulus*, a *Panolia*, and a *Rusa*), which, with Mr. Gerrard's kind assistance, I have compared with specimens in the British Museum.

1. The *Cervulus* I have identified with the *C. vaginalis* of India. But, of the seven flat skins I procured, only one has the head skin remaining. From the frontal markings on this no doubt is left as to the Hainan species being the Indian, and not *C. reevesi* of China as one would rather have expected it to be. The forehead of this specimen is rich chestnut, with two tufts of black hair, about $\frac{3}{4}$ inch in diameter each, set between the eyes but in rear of their line. Its upper parts are bright chestnut, deeper along the back, and yellower on the sides; under parts brighter-coloured, whitish on the throat and under neck. Its short tail is rich chestnut above, pure white below. In one or two of the skins the fore leg from the shoulder to the knee is strongly tinged with black.